1977 Insect Pest Management Guide

FIELD and FORAGE CROPS

You must be certified as a pesticide applicator by October 21, 1977, to use "restricted use" pesticides. See your county extension adviser for information.

Pest Management

Insects and related pests play a major role in field crop production in Illinois. Although agronomic practices developed during the past century have reduced the importance of some insect pests, they have increased the importance of others. Agronomic practices such as certain tillage operations, destruction of crop residues, selection of resistant hybrids, adjustment of planting dates, rotation of crops, and so on, if used properly, still serve to help suppress insect populations. Where possible, these practices continue to be used to provide more balanced insect control.

Practical applications of many insect-control techniques continue to be thoroughly investigated. Such control methods as insect sterilization, insect growth regulators, release of insect parasites and predators, attractants for insect baits and traps, propagation and dissemination of insect disease organisms, as well as the use of insecticides, are being pursued. Despite the most optimistic reports, however, it is readily apparent that insecticides will be an important part of pest management for many years to come.

Policy Statement

These suggestions for the use of insecticides are based on available data. Soil texture, soil pH, rainfall, slope of the field, wind velocity at planting, and other unpredictable factors affect the efficiency. Please report control failures and the circumstances associated with such failures to us.

Requested label clearances for a few uses of some insecticides, carriers, and solvents are uncertain for 1977, since many requests have not yet been officially cleared. Anticipating needed changes in labeling, we began modifying these suggested uses a few years ago. We have attempted to anticipate any further label changes in 1977, but an occasional use may still be canceled. Be sure to check with your county extension adviser if you are in doubt about the insecticide you plan to use. We will make announcements of label changes through the news media to keep you up to date.

Insecticides

The chemical names referred to in this circular may be unfamiliar to you. These names are the common coined chemical names and as such are not capitalized (for example, terbufos). Trade names are capitalized (for example, Counter). In the table of limitations, the trade names are listed first, and the common name is in parentheses following the trade name. However, in the tables of suggestions, the trade name is used if there is one. In case of question, refer to the following list or to the table of limitations:

Trade name	Common name
Counter	terbufos
Cygon	dimethoate
Dasanit	fensulfothion
diazinon	diazinon
Dibrom	naled
Di-Syston	disulfoton
Dyfonate	fonofos
Dylox	trichlorfon
ethyl parathion	parathion
Furadan	carbofuran
Guthion	azinphosmethyl
Imidan	phosmet
Lannate	methomyl
Lorsban	chlorpyrifos
malathion	malathion
Meta-Systox R	oxydemetonmethyl
methoxychlor	methoxychlor
methyl parathion	methyl parathion
Mocap	ethoprop
Penncap-M	methyl parathion (microencapsulated)
Sevin	carbaryl
Supracide	methadathion
Systox	demeton
Thimet	phorate
toxaphene	toxaphene
Trithion	carbophenothion

Pesticide Safety

Certain precautionary steps should be taken when handling insecticides. Some of the insecticides suggested in the publication can be poisonous to the applicator. The farmer is expected to protect himself, his workers, and his family from needless exposure.

UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN
In cooperation with ILLINOIS NATURAL HISTORY SURVEY
COLLEGE OF AGRICULTURE
CIRCULAR 899
COOPERATIVE EXTENSION SERVICE
Urbana, Illinois, December, 1976

When using insecticides, apply all the scientific knowledge available to insure that there will be no illegal residue on the marketed crop. Such knowledge is condensed on the label. READ THE LABEL CAREFULLY AND FOLLOW THE INSTRUCTIONS. But the label should be recent and not from a container several years old. Do not exceed maximum rates suggested; observe the interval between application and harvest; and apply only to crops for which use has been approved. Make a record of the product used, the trade name, the percentage content of the insecticide, dilution, rate of application per acre, and the date or dates of application.

Always handle insecticides with respect. The persons most likely to suffer ill effects from insecticides are the applicator and his family. Accidents and careless, needless overexposure can be avoided. Here are a few rules that if followed will prevent most insecticide accidents:

1. Wear rubber gloves when handling insecticide concentrates.
2. Do not smoke while handling or using insecticides.
3. Keep your face turned to one side when opening, pouring from, or emptying insecticide containers.
4. Leave unused insecticides in their original containers with the labels on them.
5. Store insecticides out of reach of children, irresponsible persons, or animals; store preferably in a locked building. Do not store near livestock feeds. Better yet, buy no more pesticide than you will use. This eliminates a pesticide storage and disposal problem.
6. Wash out and bury, burn, or haul to the refuse dump all empty insecticide containers.
7. Do not put the water-supply hose directly into the spray tank.
8. Do not blow out clogged nozzles or spray lines with your mouth.
9. Wash with soap and water exposed parts of body and clothes contaminated with insecticides.
10. Do not leave puddles of spray on impervious surfaces.
11. Do not apply to fish-bearing or other water supplies.
12. Do not apply insecticides, except in an emergency, to areas with abundant wildlife.
13. Do not apply insecticides near dug wells or cisterns.
14. Do not spray or dust when weather conditions favor drift.
15. Observe all precautions listed on the label.
16. To avoid bee kill, apply insecticides after bee activity has been completed for the day; use the least toxic materials. *Warn beekeepers that you are applying insecticides.*

SPECIAL SUGGESTIONS AND MAJOR CHANGES FOR 1977

Federal and State Laws

Currently, the U.S. Environmental Protection Agency is classifying pesticides according to general and restricted use as required by the passage of the Federal Environmental Pesticide Control Act of 1972. After October, 1977, anyone applying a restricted-use pesticide must be certified. *Commercial* applicators who apply restricted-use pesticides will be certified; *private* applicators who use restricted-use pesticides "for the purpose of producing any agricultural commodity on property owned or rented by him or as exchange labor (no compensation) on the property of another will need to be certified." Commercial applicators will include not only the person applying a pesticide for hire but also governmental personnel, chemical company representatives, and others involved in demonstrational, regulatory, and public health pest control. Certification as a commercial applicator will require the passage of a written examination administered by either the Illinois Department of Agriculture or the Department of Public Health.

Educational training programs for farmers (private applicators) and commercial pesticide applicators will be conducted by the Cooperative Extension Service to prepare persons for certification as pesticide applicators early in 1977. For additional information, consult your county extension adviser. The actual certification and issuing of permits or licenses will be handled by the Illinois Department of Agriculture or the Department of Public Health.

Illinois law now permits a farmer to apply any pesticide to his own farm and the farms of two others without being a licensed applicator. A commercial applicator applying pesticides for hire outside a structure must be licensed under Illinois law.

Insecticide Restrictions in Illinois

The chlorinated hydrocarbons — aldrin, chlordane, dieldrin, endrin, heptachlor, and lindane — cannot be used on dairy farms except around the farm residence. This ruling was adopted by the Illinois Department of Public Health in 1971 at the recommendation of the Interagency Committee on the Use of Pesticides. The use of DDT in Illinois is banned except where special permits are obtained from the Illinois Department of Agriculture or the Department of Public Health.

In 1974, the U.S. Environmental Protection Agency (EPA) suspended the manufacture of aldrin and dieldrin for agricultural purposes. Existing supplies can still be used. All agricultural uses of heptachlor and chlordane, with the exception of use on corn, were suspended by the EPA effective July 29, 1975; use on corn was suspended August 1, 1976. However, any product containing heptachlor or chlordane that was formulated before July 29, 1975, may be used for any use listed on the product label. The heptachlor seed treatment label was unaffected by the suspension order, and heptachlor can continue to be used for this purpose.

Because of insect resistance and possible insecticide residues in crops, livestock, and livestock products, as well as limited yield returns, we strongly advise against the use

of aldrin, chlordane, dieldrin, endrin, heptachlor, and lindane in Illinois. All three corn rootworm species, seed-corn beetles, seed-corn maggots, and possibly wireworms and white grubs are no longer effectively controlled by these insecticides.

Farmers are cautioned to omit the use of aldrin, heptachlor, or chlordane for one crop year before growing soybeans in a field.

Suggestions for Insect Control in 1977

Predicting Need for Soil Insecticides on Corn

Many farmers in Illinois will not have a soil-insect problem on corn in 1977. The type of crop rotation influences to a great extent whether a soil-insect problem will occur and the kind. Following are some guidelines for predicting soil-insect problems in corn and determining the need for using a soil insecticide at planting time. Exceptions can be expected occasionally since soil-insect problems are influenced by a variety of conditions unrelated to crop rotation — weather, soil type, planting date, hybrid, tillage, natural enemies, and others. Knowledge of soil-insect damage in a particular field in previous years is also helpful, since infestations tend to occur in the same fields and in the same area.

Corn After Soybeans

The potential for soil-insect problems in corn following soybeans is generally low. Soil insecticides are rarely necessary. In most fields of corn after soybeans, a diazinon planter-box seed treatment will be adequate to protect against attack by seed-corn beetles and seed-corn maggots. There are a few exceptions. *Corn rootworms* may occasionally be a problem when beetles deposit their eggs in soybean fields that contain volunteer corn, which when planted to corn the following year may have economic damage. Rootworm beetles will feed on the foliage of soybean plants, and they are especially attracted into soybean fields that are weedy and contain volunteer corn. Using a herbicide or clean cultivation will reduce the attractiveness of soybean fields to rootworm beetles. Clean fields of soybeans will permit soybean-corn rotations with no damage from corn rootworms. *Black cutworms* may be a problem in corn where excess soybean plant debris remains on the soil surface following chisel-plowing. *White grubs* are an occasional problem in east-central Illinois in corn after soybeans.

Corn After Corn

The potential for rootworm damage is moderate to severe in the northern half of Illinois, and a rootworm insecticide may be needed in fields of continuous corn. Wireworms are occasionally a problem in southern areas. See discussions under rootworms and wireworms.

Corn After Grass Sod

Wireworms and white grubs are potential problems. Apply a soil insecticide at planting time.

Corn After Clover and Alfalfa

Grape colaspis, grubs, wireworms, and cutworms are potential problems. Rootworms may be a problem in northern Illinois in corn following clover or alfalfa. Apply a soil insecticide at planting time.

Corn After Small Grain

There is a slight potential for damage by wireworms, seed-corn beetles, and seed-corn maggots. In most instances, a diazinon planter-box seed treatment will be adequate. If wireworms are present, use a soil insecticide at planting.

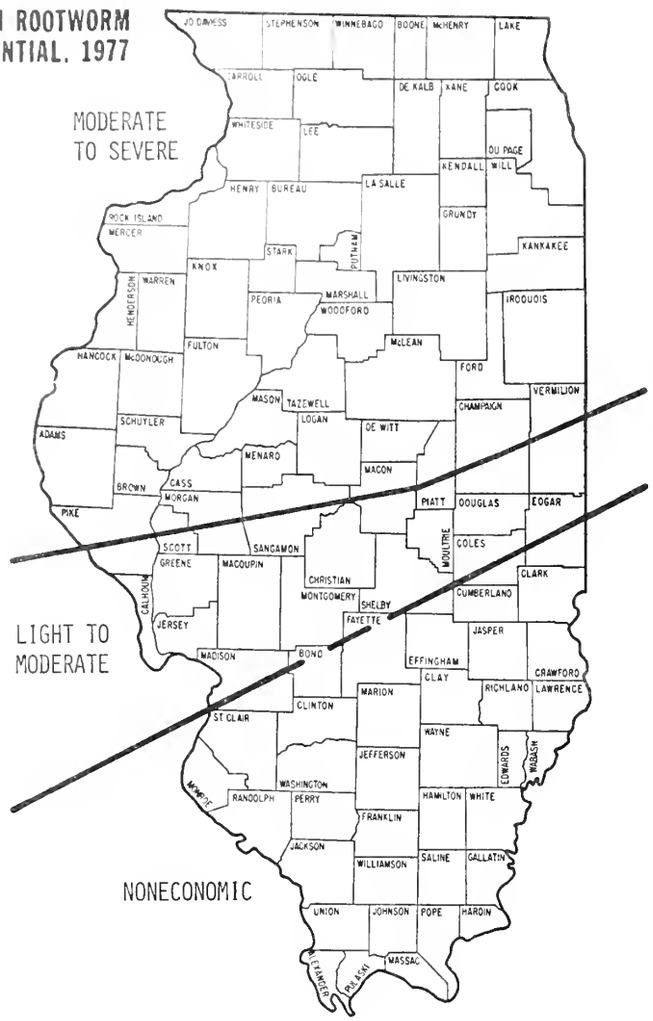
Corn Rootworms

Rootworm Situation, 1977. Moderate to severe damage by western and northern corn rootworms is expected in many fields of corn following corn in the area north of a line from Pittsfield to Decatur to Danville (see map). Light to moderate damage is expected in some fields in south-central counties north of a line from Collinsville to Paris. The potential for rootworm damage south of this line is low. These predictions are based on a survey of rootworm beetle populations taken in August, 1976.

Western and northern corn rootworm beetle populations in the northern two-thirds of Illinois were the highest ever observed. Corn growers in the problem areas should base the need for a rootworm soil insecticide on the presence of rootworm beetles observed feeding on silks in cornfields last August. An average of one or more beetles per plant in August, 1976, indicates potential for damage, and a soil insecticide should be used if the field is replanted to corn in 1977. If counts averaged less than one rootworm beetle per plant last August, the potential for damage is low, and a soil insecticide will not be needed in 1977.

Lodging or elbowing of corn during July and August is also an indicator of rootworm damage.

Rootworm Life Cycle. Western and northern corn rootworm beetles deposit their eggs in the soil at the base of the corn plants or between the rows during August and September. The eggs overwinter in the soil and commence hatching in late May. Egg hatch usually takes place over a period of three to five weeks. Consequently, in July and August all stages of the corn rootworm — egg, larva, pupa, and adult — may be found. The rootworm larvae feed on the roots of the corn plants during June, July, and August. When a larva is fully grown (½ inch), it will build a cavity in the soil and go into the pupal, or resting, stage. After 5 to 10 days, the beetle will emerge from the soil. The development from egg hatch to adult emergence will take 27 to 40 days. Under field conditions and after mating, 14 days or more will elapse before the females commence egg laying. Rootworm beetles may deposit up to 1,000 eggs; an average of 500 per female is probably common. Most egg laying in Illinois occurs after August 1, and a high percentage of the eggs are deposited after August 10.



Reasons for High Rootworm Beetle Populations in 1976. Early planting in 1976 was the main factor responsible for high rootworm beetle populations in July and August, 1976. Soil insecticides applied at planting in early to mid-April had lost much of their potency by the time rootworm eggs hatched in late May and June. Hence, the late-hatching larvae were not controlled, resulting in high survival and, ultimately, high beetle numbers. Insecticide rates were also too low in some fields, resulting in poor or marginal control.

Heavy rains in some areas shortly after planting also hastened the decomposition of the soil insecticides and reduced control. Although there were high beetle populations in many fields treated with rootworm insecticides, the incidence of lodging or elbowed corn resulting from larval feeding was not always evident. Most areas in northern Illinois did not receive high winds and hard rains during July and August, and even though rootworm damage occurred in field corn, the plants remained standing.

Insect resistance to the organic phosphate and carbamate insecticides in Illinois has not been conclusively demonstrated in research tests. We anticipate that rootworm resistance to soil insecticides may occur within the next few years, considering the fact that a high percentage of the corn is being treated with soil insecticides.

Rootworm Control by Cultural Practices. Here are several nonchemical means of rootworm control.

1. Crop Rotation. This is the most effective method of preventing corn rootworm damage. If practical, do not grow corn two years in succession in the same field. All research to date indicates that corn following soybeans is unlikely to have a rootworm problem, and, consequently, would not need to be treated with a soil insecticide. An exception might be when corn is planted after soybeans if there was an extensive infestation of volunteer corn or weeds in the soybeans during August. Corn following alfalfa may benefit from treatment since rootworm beetles occasionally deposit their eggs in alfalfa fields during the bloom stage in August.

Cornfields averaging less than one rootworm beetle per plant in August, 1976, can be planted to corn in 1977 without using a soil insecticide.

If a cornfield had a high population of rootworm beetles last August (five or more per plant), consider planting this field to a crop other than corn in 1977 to break the rootworm cycle. Fields with one or more rootworm beetles per plant should either be rotated to another crop or treated with a soil insecticide.

2. Variety. Select a variety that has good standability and root regeneration capability if damaged by rootworms.

3. Planting Date. Plant last those fields that had high populations of rootworm beetles last August. As compared with early planting, this will help minimize the breakdown of the soil insecticides before egg hatch commences in late May and June.

Fields that were planted in late May or in June, 1976, are likely to have high numbers of rootworm eggs, deposited by beetles last August and September. It would be preferable to plant these fields to a crop other than corn in 1977. If a sweet corn or silage field was harvested before August 10, 1976, no soil insecticide is needed if the field is planted to corn in 1977.

Rootworm Control With Insecticides. The following are suggestions for chemical rootworm control.

1. Planter Application. Soil insecticide suggestions and rates for corn rootworm control, based on research data at the University of Illinois, are shown in the table.

For 1977, Counter is expected to give the most consistent control of corn rootworm larvae. Furadan and Dyfonate should give fair to good control; Thimet, Lorsban, and Mocap should give fair control. None of these insecticides will give complete control of rootworms, but all should reduce them to an acceptable level. *In general, if a soil insecticide gave fair to good control in 1976, it will probably give adequate control in 1977. Exceptions may occur if a particular insecticide has been used for several consecutive years in the same field. Alternating or rotating soil insecticides may be beneficial in some fields, based on*

Soil Insecticides Suggested for Corn Rootworm Control at Planting, 1977

Insecticide	Class	Performance[a]	Ounces of product per 1,000 ft. of row	Pounds of product needed per acre			
				40″ rows	38″ rows	36″ rows	30″ rows
Counter 15G	Organic phosphate	Good	8	6.7	7.0	7.4	8.7
Dyfonate 20G	Organic phosphate	Fair to good	6	5.0	5.3	5.6	6.7
Furadan 10G	Carbamate	Fair to good[b]	12	10.0	10.5	11.1	13.3
Thimet 15G	Organic phosphate	Fair	8	6.7	7.0	7.4	8.7
Lorsban 15G	Organic phosphate	Fair	8	6.7	7.0	7.4	8.7
Mocap 10G	Organic phosphate	Fair	12	10.0	10.5	11.1	13.3

[a] Based on research data at 29 field locations in Illinois during 1976.
[b] Control with Furadan was less effective in fields where Furadan had been used for two or more consecutive years.

research data in 1976. If an insecticide gave poor control last year, switch to another insecticide in 1977.

Research indicates that switching from a carbamate (Furadan) to an organic phosphate (Counter, Dyfonate, Thimet, Lorsban, or Mocap) may be desirable, particularly if Furadan has been used for several consecutive years in the problem field. The advantages of switching from an organic phosphate to a carbamate are less apparent. Consequently, if control with Furadan was marginal or poor in 1976, switch to an organic phosphate in 1977. If control with an organic phosphate was poor last year, switch to a carbamate (Furadan) or, possibly, to Counter or Dyfonate (organic phosphates). In most tests, Counter and Dyfonate gave fair to good control of rootworms, even where an organic phosphate insecticide had been used previously for several years.

During 1976, in research test plots where Furadan had been used for two or more consecutive years, rootworm damage in Furadan-treated plots was no different from that in untreated plots in 4 of 11 fields. In fields with a history of two or more years of organic phosphate soil insecticide use, Furadan was equal to, or better than, all the other organic phosphate soil insecticides in seven of seven tests.

A word of caution about rotating soil insecticides. There were a few instances last year in which rotation of soil insecticides by farmers did not give good results. The performance of an insecticide that gives only fair control of rootworms will not be improved by rotation with other insecticides. Performance might be enhanced under favorable weather conditions or with light infestations.

The theory of rotating rootworm soil insecticides, while basically sound, may be only a short-term solution to a long-term problem. Whenever insecticides, regardless of type, are used continuously and extensively over a large area, insect resistance to that insecticide is likely to occur. For example, western and northern corn rootworm populations in Illinois are resistant to aldrin, heptachlor, and chlordane (chlorinated hydrocarbons).

The performance of rootworm soil insecticides in test plots in 1976 does not necessarily imply similar results for 1977, but it is the best guide available. Rootworm control was variable in test plots. The variability is probably because of weather, soil type, density of infestation, and other unknown factors.

2. Cultivator Application. A basal treatment of soil insecticide applied with a cultivator in May or early June may be more effective than planting-time treatments applied in early April. Apply Furadan, Thimet, Dyfonate, or Mocap during May or early June, or at lay-by time in untreated fields. Rootworm control is enhanced by applying the insecticide near to egg hatch, which normally begins in late May. The threshold for treatment is three larvae per plant. If there was an average of one or more beetles per plant last August, apply the cultivator treatment, even if no larvae are found. Apply 1 pound active ingredient per acre, based on 40-inch row spacing (see suggestions for rotation of soil insecticides above).

Planting-time treatments of soil insecticides applied in early April may give marginal control. To determine the need for cultivator treatment in these fields, examine the root systems of 10 plants in late May or early June. If root pruning or tunneling is obvious and larvae are present, consider a cultivator application of one of the insecticides above.

3. Control of Rootworm Beetles. Current research indicates that aerial sprays of Sevin 4-Oil and other insecticides applied in August will not always eliminate rootworm damage and the need for a rootworm soil insecticide the following year. We suggest the use of aerial applications to prevent pollination damage only, until further research is completed to determine the optimum time for applying insecticides.

4. Liquid Formulations. Furadan 4F and Dyfonate 4E may be mixed with water or liquid fertilizer and applied as a spray in a 7-inch band ahead of the press wheel or with a split-boot applicator. The fluid fertilizer selected must be compatible with the insecticide. A test should be conducted to make certain that the mixture is physically compatible before planting. Maintain agitation in the tank after mixing and during application. *Use caution when handling liquid formulations.* They are more toxic than granular formulations. Broadcast applications are not cleared for rootworm control.

Use Scouting to Predict Rootworm Problems. The presence or absence of rootworm beetles in a cornfield is an excellent indicator of future problems. Corn growers can determine the potential for rootworm damage in 1978 by counting western and northern corn rootworm beetles between August 1 and 25, 1977, in this way:

1. Collect the western and northern corn rootworm beetles from the tips of 50 ears at two different times about 7 to 10 days apart between August 1 and 25. It will take about 45 minutes to make your collections in a 40-acre field.

2. To collect your sample, clasp the ear tip and silks tightly in one hand, cut off the silks at the ear tip with a sharp knife, and place the silks in a plastic bag 6 inches by 12 inches. Keep the bag tightly closed to prevent the beetles from escaping.

3. Collect 50 ear tips at random throughout the field. Avoid sampling along the field edges. Approach plants slowly to avoid disturbing the beetles.

4. Place the plastic bag in a freezer for about two hours to immobilize the beetles. Then spread the contents on a newspaper and count the number of beetles on the 50 ear tips.

5. Fields averaging less than one rootworm beetle per plant in August, 1977, can be planted to corn in 1978 without a soil insecticide treatment. If the average is one or more beetles per plant for any sampling date, plan to apply a rootworm insecticide in 1978.

Wireworms

A check can be made for wireworms before planting by placing baits in the soil at six locations in a field. The baits should be placed in a hole about 3 to 6 inches below the soil surface around April 1. Place two baits at the highest field elevation, two on the slope, and two at the lowest area. Use a mixture of 1 cup of wheat and 1 cup of shelled corn at each bait station. Cover the bait with soil and mark the locations with a flag or stake. In 10 to 14 days, dig up the baits and examine for wireworm larvae. Overwintering wireworms are attracted to the baits. If there is an average of one wireworm per bait station, use an insecticide. Apply Furadan or Counter in the furrow, or Thimet, Dasanit, or Mocap in a 7-inch band ahead of the press wheel. Many fields in Illinois will contain an occasional wireworm larva, but most fields will not have any, or at most one or two worms on six bait traps. For these, no treatment is recommended.

Black Cutworms

When corn plants are beginning to emerge, check fields for signs of leaf feeding, cutting, wilting, or missing plants. Small cutworm larvae (less than ½ inch) feed on the leaves and do not begin cutting plants until they are about half grown. Early detection of leaf feeding or cutting is vital for effective control. If you find 3 percent or more of the plants being cut, or 2 or more half-grown cutworms per 100 plants, a control measure is needed immediately. Apply a Sevin pellet bait, or sprays of Sevin or Dylox at the first sign of cutworm damage. The pelletized bait should be broadcast on the surface of the soil and not incorporated. The sprays should be banded over the row.

A planting-time treatment of Mocap 10G has received label registration by the Environmental Protection Agency to "aid in control" of black cutworms. Mocap should be applied at the rate of 1 pound active ingredient per acre (40-inch rows) in a 7-inch band ahead of the press wheel. Research data in Illinois indicates that Mocap is relatively effective in controlling light infestations of cutworms.

Planter-Box Seed Treatments

A diazinon planter-box seed treatment will protect against attack by seed-corn beetles and maggots during germination. Use a seed treatment in fields that don't receive a soil insecticide at planting or when Furadan, heptachlor, or chlordane is applied at planting. The diazinon planter-box seed treatment is not needed if Counter, Dasinit, Dyfonate, Lorsban, Mocap, or Thimet is applied at planting. NOTE: Some loss of the seed treater will occur in air planters. Excess dust from the seed treater may also interfere with the monitor in air planters.

No-Till Corn

Soil insecticides can be profitably applied to corn following grass sod, or in any rotation in which grasses and weeds are prevalent. In no-till corn research trials. Furadan has controlled armyworms, billbugs, and flea beetles and has suppressed common stalk borers, first-generation European corn borers, wireworms, and white grubs when applied at 2 pounds active ingredient per acre at planting time in the furrow or as a 7-inch band ahead of the press wheel. Lower rates of Furadan are less effective against this insect complex, but may give better results than other soil insecticides. Based on these data, growers with a no-till corn program may wish to apply Furadan at planting time.

On no-till corn following corn (except in the rootworm area), soybeans, or a small grain, it does not generally pay to apply a soil insecticide. However, a diazinon seed treatment should be used.

Thimet, Dasanit, Dyfonate, Counter, Mocap, and Furadan will give some control of wireworms and white grubs in no-till corn planted in grass sod.

Alfalfa Weevil

In 1977 we expect alfalfa weevils to cause moderate to severe damage to the first cutting of alfalfa in all areas of Illinois. Last year extensive damage occurred south of Interstate 80. Growers should inspect alfalfa fields closely during April and May for signs of weevil damage.

FIELD CORN

Insect	Time of attack	Insecticide[1]	Lb. active ingredient per acre	Placement	Timing of application (See table of limitations, page 11)
Corn rootworm	June-August	Counter	1[2]	7-inch band	Apply ahead of planter press wheel. See discussion on page 4. Basal treatments during cultivation with Furadan, Dyfonate, Thimet, or Mocap are effective.
		Dyfonate	1[2]		
		Furadan	1[2]		
		Thimet	1[2]		
		Lorsban	1[2]		
		Mocap	1[2]		
Seed-corn beetle	At germination	diazinon	1½ oz. per bu. of seed	On seed	Or as a band treatment, use Counter, Dasanit, Dyfonate, or Thimet.
Seed-corn maggot	At germination	diazinon	1½ oz. per bu. of seed	On seed	Or apply Counter in the furrow or band treatments of Dasanit or Dyfonate.
Wireworm	May-June	Counter	1[2]	Furrow	Counter and Furadan should be applied in the seed furrow. Except for Furadan, all others as a 7-inch band ahead of the press wheel. If infestations are severe, control may not be satisfactory.
		Dasanit	1[2]	7-inch band	
		Dyfonate	4	Broadcast	
		Furadan	2[2]	Furrow	
		Mocap	1[2]	7-inch band	
		Thimet	1[2]	7-inch band	
White grub Grape colaspis	May-October May-June	The soil insecticides suggested for wireworms will give partial control of white grubs and grape colaspis. Furadan and Counter should be applied in the seed furrow and the other insecticides in a 7-inch band ahead of the press wheel. However, they are not labeled for these pests.			
Sod webworm	May-June	Sevin	1	At base of plant	At time of initial attack.
Cutworms	May-June	Sevin bait	1-2	Broadcast	When feeding starts. Repeat if needed.
		Sevin plus molasses or Tractum	2	Direct at base of plant	Same as above. Use 1 quart of molasses per acre. Apply in the spray mix.
		Dylox spray	1	At base of plant	When feeding starts.
		Mocap	1	7-inch band	At planting. Aids in control.
Billbug	May-June	Sevin	1	At base of plant	Apply sprays as needed.
		diazinon	1		
Garden symphylan	May-July	Dyfonate	2	Broadcast	Before planting, lightly incorporate.
Grasshopper	June-September	Sevin	¾	Over row as spray	As needed. For ensilage corn use Sevin, diazinon, or malathion.
		toxaphene	1½		
		diazinon	½		
		malathion	1		
Flea beetle	May-June	Sevin	¾	Over row as spray	When damage becomes apparent on small corn.
		diazinon	½		
		toxaphene	1½		
Armyworm	May-June	Sevin	1½	Over row as spray	At first migration or when damage first becomes apparent.
		malathion	1		
		toxaphene	1½		
		Dylox	1		
	Late July, August	toxaphene	1½	Broadcast	When leaves below ear level are consumed and worms eating leaves above ear level.
Fall armyworm	June; August-September	Sevin	1½	In whorls	Granules preferred when worms deep in whorl. If worms are small and out on leaves, sprays are effective. When silking, see suggestions for corn earworm.
		diazinon	1		
		Dylox	1		
		toxaphene	1½		
Chinch bug	June-August	Sevin	1	Spray at base of plant	At start of migration. If applied in adjacent small grain, do not harvest.
Thrips	June	Sevin	1	On foliage as spray	When severe wilting and discoloration are noticed.
		malathion	1		
Japanese beetle	July-August	Sevin	1	Over plant	During the silking period to protect pollination.
Mites	July-August	Thimet granules	1	Into whorl	When leaves below ear are being killed and infestation is increasing.
		Meta-Systox R	½	Over plant	
Corn leaf aphid	July-August	diazinon granules	1	In whorl	Just before tasseling when aphids are appearing on individual plants. Preventive treatment. Not after tassel emerges. For seed fields only and not if field is to be detasseled by hand
		Thimet granules	1		
		malathion	1	Foliage spray	Apply during late whorl to early tassel when 50% of the plants have light to moderate infestations.
		diazinon	1		

[1] See page 11 for insecticide restrictions.
[2] Based on 40-inch row spacing. Increase rates for narrow rows.

FIELD CORN (continued)

Insect	Time of attack	Insecticide[1]	Lb. active ingredient per acre	Placement	Timing of application (See table of limitations, page 11)
Corn rootworm adults	Late July, early August	Sevin malathion diazinon	1 1 ½	Overall spray or directed towards silk	Before 50% of plants have silked and if there are more than 5 beetles per ear. Only to protect pollination.
Corn earworm	July-August	Sevin	1½	Spray ear zone	Two applications at 3- to 5-day intervals, starting at 30-50% silk.
Corn borer, first generation	June-July	Sevin granules diazinon granules	1½ 1	On upper ⅓ of plant and into whorl	When tassel ratio is 30 to 50, and 50% or more plants show recent borer feeding in whorl.
Corn borer, second generation	Mid-August	Sevin diazinon granules	1½ 1	From ear upward	Use Sevin spray or granules. At first hatch when there are 1 or more egg masses per plant.
Southwestern corn borer	August	Furadan	1	From ear upward	Direct granules into whorls. Apply when 25% of plants have egg masses or larvae on leaves. Early-planted corn usually escapes damage.

[1] See page 11 for insecticide restrictions.

STORED GRAIN (Corn, Wheat, and Oats)[1]

Insect	Time of attack	Insecticide and dilution	Dosage	Placement	Suggestions (See table of limitations, page 11)
Angoumois grain moth (earcorn)	April-October (southern ⅓ of Illinois only)	malathion 57% E.C., 3 oz. per gal. water	Apply to runoff	Spray surface and sides May 1 and August 1	Plant tight husk varieties. Store as shelled corn to avoid all but surface damage by angoumois moth.
Meal moths and surface infestations only[2]	April-October	dichlorvos 20% (DDVP, Vapona) plastic resin strip[3]	1 per 1,000 cu. ft. space above grain mass	Attach to ceiling or side wall	Clean and spray bin with 1.5% malathion to runoff before storage. Store only clean dry grain. Install June 1 or at storage. Replace in mid-August.
		pyrethrin 6% + piperonyl butoxide 60% E.C., 4½ oz. per gal. water	2 gal. per 1,000 sq. ft.	Spray grain surface, bin walls, and ceiling	Clean and spray bin with 1.5% malathion to runoff before storage. Store only clean dry grain. Apply June 1 or at storage and monthly thereafter during summer months
General					
Internal and external feeders Rice and granary weevils Flat grain beetle	April-October	malathion 57% E.C., 1 pt. per 3-5 gal. water[4]	3-5 gal. per 1,000 bu.	Spray uniformly as grain is binned	Clean and spray bin with 1.5% malathion to runoff before storage. Store only clean dry grain. Protect surface with dichlorvos resin strips or pyrethrin spray as recommended for meal moths.
Saw-toothed grain beetle Rusty grain beetle Foreign grain beetle Cadelle beetle Flour beetle		liquid fumigant[5,6]	3-5 gal. per 1,000 bu.	On surface; repeat if necessary	Clean and spray bin with 1.5% malathion to runoff before storage. Store only clean dry grain. Apply in late July and September in the southern half of Illinois; apply in mid-August in the northern half of Illinois. Protect surface with dichlorvos resin strips or pyrethrin spray as recommended for meal moths.
		methyl bromide + ethylene dibromide[6,7]	As directed	On surface	
		aluminum phosphide[6,8]	180 tablets per 1,000 bu.	Tablets 2 feet apart	

[1] Corn need not be treated if harvested after October 1 unless it is to be carried over the following summer. Wheat and oats should be treated if they are to be held for one month or more in storage after harvest.

[2] Remove webbing before treatment.

[3] Effective only in enclosed bins. Kills adult moths but not the eggs or larvae. Several weeks required to effectively control an existing infestation. Also cleared for use in bins of stored soybeans.

[4] Use only the grade of malathion labeled for use on stored grain. Apply after drying, as malathion vaporizes and is lost rapidly when grain is heat-dried.

[5] Some common liquid fumigants are: carbon bisulfide + carbon tetrachloride, ethylene dichloride + carbon tetrachloride, ethylene dichloride + ethylene dibromide + carbon tetrachloride, etc.

[6] Use with extreme caution. Apply only under calm conditions and when grain temperature is 70° F. or above. Grain should be 8 inches below the lip of the bin and should be leveled before fumigating.

[7] Called the 73 mixture.

[8] Called Phostoxin. Slow vaporization with a 3-day exposure period.

ALFALFA AND CLOVER

Insect	Time of attack	Insecticide[1]	Lb. active ingredient per acre	Placement	Timing of application[2] (See table of limitations, page 11)
Alfalfa weevil (Spring treatment)	March-June	Furadan[3,4]	¼	On foliage	When 25% of the tips are being skeletonized and there are 3 or more larvae per stem, treat immediately; 2 treatments may be necessary on first cutting; regrowth following first cutting may need protection. By ground, use a minimum of 20 gal. of finished spray per acre (10 gal. on stubble) or 4 gal. by air. Do not apply during bloom. Instead cut and remove hay.
		Guthion[3]	½		
		methyl parathion[3]	½		
		Supracide[3]	½		
		Lannate[3]	0.9		
		malathion plus methoxychlor	¾ ¾		
		diazinon plus methoxychlor (Alfatox)	½ 1		
		Imidan	1		
		Penncap-M	½		
Clover leaf weevil	March-April	malathion	1	On foliage	When larvae are numerous and damage is noticeable, usually early to mid-April.
Spittlebug	Late April, early May	Guthion[3]	½	On foliage	When bugs begin to hatch and tiny spittle masses ear found in crowns of plants.
		malathion	1		
Aphid	April-May	Cygon	½	On foliage	When aphids are becoming abundant and lady beetle larvae and adults, parasites, and disease are slight.
		diazinon	½		
		malathion	1		
Leafhopper	Early July	Sevin	1	On foliage	When second-growth alfalfa is 4 to 6 inches high, or as needed.
		diazinon	½		
		Cygon	½		
		Dylox	¾		
Webworm	July-August	Sevin	1	On foliage	When first damage appears.
		Dylox	1		
Cutworm	April-June	Sevin	1½	On foliage	Cut, remove hay, and spray immediately.
		Dylox	1		
Armyworm	May-June, September	Sevin	1½	On foliage	Only when grasses are abundant.
		malathion	1		
		Dylox	1		
Seed crop insects	July-August	toxaphene[5]	1½	On foliage	No later than 10% bloom.
Grasshopper	June-September	Cygon	½	On foliage	When grasshoppers are small and before damage is severe. When bees are frequenting bloom, do not apply Sevin or Cygon. Apply others only late in day.
		Sevin	¾		
		diazinon	½		
		malathion	1		
		Dibrom	¾		

[1] See page 11 for insecticide restrictions.
[2] Before applying insecticides, be certain to clean all herbicides out of equipment. During pollination, apply very late in day or, if possible, avoid application during bloom.
[3] To be applied only by experienced operators or those wearing protective clothing.
[4] Only for pure stands of alfalfa. When using no more than ¼ pound per acre, allow 7 days between application and harvest. If you use ¼ to ½ pound per acre, allow 14 days to elapse between application and harvest.
[5] Not for use on dairy farms. Do not apply as foliage sprays or dusts to fields adjacent to dairy pasture, hay, or forage crops.

SMALL GRAINS (Barley, Oats, Rye, Wheat)

Insect	Time of attack	Insecticide[1]	Lb. active ingredient per acre	Placement	Timing of application (See table of limitations, page 11)
Grasshopper	June-August	malathion	1	On entire plant	Apply early while grasshoppers are small.
		toxaphene[2]	1½		
Armyworm	May-June	malathion	1½	On foliage	When worms are still small and before damage is done. Do not use Dylox on rye.
		toxaphene[2]	1½		
		Dylox	¾		
Greenbug English grain aphid	May-June	Cygon	¼	On foliage	When needed. Penncap-M is cleared for greenbug only. Use Cygon on wheat only.
		Systox[3]	¼		
		parathion[3]	¼		
		Penncap-M	¼		
		malathion	1		
Hessian fly	Sept.-October; April-May	Di-Syston	1	In drill row	Use granules in a grass-seeder for susceptible varieties planted before fly-free date.
		Thimet	1		

[1] See page 11 for insecticide restrictions.
[2] For use on dairy farms only when alternate material is not available and when insect emergency exists. Do not apply as foliage sprays or dusts to or adjacent to dairy pasture, hay, or forage crops.
[3] To be applied only by experienced operators or those wearing protective clothing.

SOYBEANS

Insect	Time of attack	Insecticide[1]	Lb. active ingredient per acre	Placement	Timing of application (See table of limitations, page 11)
Bean leaf beetle	May-June, August	Sevin[2] toxaphene[3]	1 1½	On foliage	When leaf feeding becomes severe, but before plants killed or pods eaten.
Clover root curculio adult	May-June	Sevin[2] toxaphene[3]	1 1½	On marginal rows	When clover is plowed, beetles migrate to adjacent beans.
Grasshopper	June-September	Sevin[2] toxaphene[3]	¾ 1½	On foliage	When migration from adjacent crops begins.
Green clover worm and webworm	August	Sevin[3] malathion Lannate[4] Dipel	1 1 ¼ ½	On foliage	When damage occurs between blooming and pod fill. Usually requires 12 or more half-grown worms per foot of row and 15% defoliation to justify treatment.
Thistle caterpillar and webworm	June-August	Sevin	1		Usually requires 15% or more defoliation between blooming and pod-fill to justify treatment.
Mites	June-August	Trithion[4] Cygon	¾ ½	On foliage	As needed on field margins and entire field.
Stink bugs	July and August	Sevin[2]	1	On foliage	As needed when bugs are numerous; 1 per yard of row may cause damage.
Thrips Leafhoppers	June-August	malathion Sevin[2]	1 ¾	On foliage	As needed.
Mexican bean beetle	May-August	Sevin malathion Penncap-M	1 1½ ½	On foliage	If stand is being reduced on seedling beans or when defoliation exceeds 40% before bloom.

[1] See page 11 for insecticide restrictions on soybeans.
[2] Sevin should not be used at more than 1 lb. per acre. Higher rates may damage plants.
[3] For use on dairy farms only when alternate material is not available and when insect emergency exists. Do not apply as foliage sprays or dusts to or adjacent to dairy pasture, hay, or forage crops.
[4] To be applied only by experienced operators or those wearing protective clothing.

GRAIN SORGHUM

Insect	Time of attack	Insecticide[1]	Lb. active ingredient per acre	Placement	Timing of application (See table of limitations, page 11)
Webworm	After heads form	Sevin	1½	On grain head	When 10 to 25 percent of the heads are infested with 5 or more larvae per head. Pest usually bad in wet seasons on late planted grain.
Corn earworm	After heads form	Sevin	1½	Direct at head or broadcast	When there is an average of 2 worms per head.
Midge	August-September	Cygon diazinon Sevin	¼ ¼ 1½	Direct at head	When 50% of heads have begun to bloom and there are 1 or more midge adults per head.
Corn leaf aphids	All season	Cygon malathion	¼ 0.9	Broadcast	Under drouth conditions when populations are heavy and damage is apparent.
Greenbug	June-July	parathion[2] Cygon malathion	¼ ⅓ 0.9	Broadcast	When greenbug damage is sufficient to cause death of more than 2 normal-sized leaves before the hard-dough stage.
Fall armyworm	July-August	Sevin	1½	Over row	When there is an average of 2 worms per head. Whorl feeding is seldom economic.

[1] See page 11 for insecticide restrictions.
[2] To be applied only by experienced operators or those wearing protective clothing.

LIMITATIONS IN DAYS BETWEEN APPLICATION OF THE INSECTICIDE AND HARVEST OF THE CROP AND OTHER RESTRICTIONS ON THE USE OF INSECTICIDES FOR FIELD CROP INSECT CONTROL

(Blanks in the table denote that the material is not suggested for that specific use in Illinois)

	Worker re-entry times[a] (hours)	Field corn			Sorghum	Forage crops			
		Seed and soil	Grain	Ensilage and stover		Alfalfa	Clover	Pasture	Seed
Counter (terbufos)[b]	...	A	...	...	...	...	...	...	...
Cygon (dimethoate)	...	...	...	...	28	10,B	...	...	...
Dasanit (fensulfothion)[c]	...	A	40	40	...	...	...	...	...
diazinon	...	A	...	10	7	7	7	...	...
Dibrom (naled)	...	...	...	...	...	4	...	0	4
Dyfonate (fonofos)[c]	...	A	45	45	...	...	...	...	...
Dylox (trichlorfon)	...	...	C	C	...	0	0	0	...
parathion[c]	48	...	...	...	12	...	...	...	...
Furadan (carbofuran)[c]	...	A	...	D	...	7,B	...	...	...
Guthion (azinphosmethyl)[c]	24	...	...	...	...	16,E	16,E	...	...
Imidan (phosmet)	...	...	...	...	...	7,E	...	...	...
Lannate (methomyl)[b]	...	...	...	...	...	7	...	...	...
Lorsban (chlorpyrifos)	...	A	...	...	...	...	...	...	...
malathion	...	...	5	5	7	0	0	0	0
Meta-Systox R (oxydemetonmethyl)	...	...	7	7	...	...	...	...	...
methoxychlor	...	...	...	...	...	7	7	7	...
methyl parathion[c]	48	...	...	...	...	15	15	15	15
Mocap (ethoprop)	...	A	...	...	...	...	...	...	...
Penncap-M[d]	...	...	...	...	...	15	...	...	...
Sevin (carbaryl)	...	...	0	0	21,F	0	0	0	...
Supracide[c]	...	...	...	...	...	10,G	...	...	...
Thimet (phorate)	...	A	30,H	30,H	...	...	...	...	...
toxaphene	...	...	A	I	...	...	...	...	J

		Barley		Oats		Rye		Wheat		Soybeans	
		Grain	Straw	Grain	Straw	Grain	Straw	Grain	Straw	Grain	Forage
Cygon (dimethoate)	...	...	...	...	...	...	...	60	60	21	5
Dipel (*Bacillus thuringiensis*)	...	...	...	...	...	...	...	...	...	0	0
Di-Syston (disulfoton)	...	...	...	...	...	...	...	...	K	...	...
Dylox (trichlorfon)	...	21	21	21	21	...	...	21	21	...	...
parathion[c]	48	15	15	...	...	...	...	15	15	...	...
Lannate (methomyl)[c]	...	...	...	...	...	...	...	...	...	14	3
malathion	...	7	7	7	7	7	7	7	7	3	3
Penncap-M[d]	...	...	...	...	...	...	...	15	15	20N	20N
Sevin (carbaryl)	...	...	...	...	...	...	...	...	...	0	0
Systox (demeton)[c]	48	45,L	...	45,L	...	...	...	45,L	...	...	...
Thimet (phorate)	...	...	...	...	...	...	...	...	M	...	...
toxaphene	...	A	J	A	J	A	J	A	J	21	J
Trithion (carbophenothion)[c]	48	...	...	...	...	...	...	...	...	7	J

[a] Workers should be warned in advance of treatments. Workers may not enter fields treated with the insecticides without wearing protective clothing for the intervals indicated. They may not enter a field treated with other insecticides until the spray has dried or the dust has settled without wearing protective clothing. Protective clothing includes a hat, long-sleeved shirt, long-legged pants, and shoes and socks.

[b] Treated fields may be rotated to corn or soybeans without restrictions. Do not rotate treated fields to any other crop for 365 days. Cover crops may be planted in treated fields if plowed under and not grazed.

[c] Sprays to be applied only by experienced operators wearing proper protective clothing.

[d] Microencapsulated.

A. No specific restriction when used as recommended.

B. Apply only once per cutting, and do not apply during bloom.

C. Three applications may be made per season. Can be applied up to harvest.

D. Do not make a foliar application if Furadan 10 granules were applied at more than 10 pounds per acre at planting. Do not make more than two foliar applications per season.

E. Apply only once per cutting.

F. No time limitation on sorghums used for forage.

G. Make no more than one foliage and one stubble application per cutting.

H. Besides treatment at planting, one more application can be made at cultivation or over the corn later in the season.

I. Do not feed treated forage to dairy animals. Do not feed sprayed forage or granular-treated corn silage to livestock fattening for slaughter. Do not graze meat animals on granular-treated stover within 28 days of slaughter.

J. Do not graze or feed treated forage to dairy animals or animals being finished for slaughter.

K. Do not graze treated wheat within 30 days of treatment.

L. Apply no more than twice per season with at least 14 days between applications. Do not graze treated fields.

M. Do not graze treated wheat within 45 days of treatment.

N. Make no more than two applications per season.

References

This circular lists only suggested uses of insecticides for the control of many Illinois field crop pests, and is not designed to discuss other methods of control. Fact sheets discussing nonchemical control methods, descriptions of specific insects, and their life history and biology (designated by NHE numbers) can be obtained from offices of county extension advisers or by writing to Entomology Extension, 169 Natural Resources Building, Urbana, Illinois 61801. The following fact sheets about the insects mentioned in the circular are available:

Alfalfa Weevil — NHE-89
Angoumois Grain Moth — NHE-62
Aphid — NHE-14 and 19
Armyworm — NHE-21
Bean Leaf Beetle — NHE-67
Billbug — NHE-37
Chinch Bug — NHE-35
Clover Leaf Weevil — NHE-12
Clover Root Curculio — NHE-71
Corn Earworm — NHE-33
Corn Leaf Aphid — NHE-29
Corn Rootworm — NHE-26
Cutworm — NHE-38
Fall Armyworm — NHE-34
Flea Beetle — NHE-36
Garden Webworm — NHE-42
Grape Colaspis — NHE-25
Grasshopper — NHE-74
Green Clover Worm — NHE-75
Internal and External Feeders — NHE-64 and 65
Leafhopper — NHE-22
Meal Moths — NHE-63
Sod Webworms — NHE-42
Spittlebug — NHE-13
Sweet Clover Weevil — NHE-15
Thrips — NHE-39
White Grub — NHE-23
Wireworm — NHE-43

The following circulars can be obtained from county extension advisers or by writing to the Office of Publications, College of Agriculture, Urbana, Illinois 61801:

Circular 898, Insect Pest Management Guide — Livestock and Livestock Barns

Circular 900, Insect Pest Management Guide — Home, Yard, and Garden

These suggestions are revised annually by entomologists of the College of Agriculture and the Illinois Natural History Survey.

Issued in furtherance of Cooperative Extension Work, Acts of May 8 and June 30, 1914, in cooperation with the U.S. Department of Agriculture. JOHN B. CLAAR, Director, Cooperative Extension Service, University of Illinois at Urbana-Champaign. The Illinois Cooperative Extension Service provides equal opportunities in programs and employment.

16M—12-76—36051—MN